ITT Technical Institute

CS330

Database Design and Implementation

Onsite Course

SYLLABUS

Credit hours: 4

Contact/Instructional hours: 50 (30 Theory Hours, 20 Lab Hours)

Prerequisite(s) and/or Corequisite(s):

Prerequisite: IT203 Database Development or equivalent

Course Description:

This course examines Entity-Relationship modeling and data normalization by analyzing how keys and constraints are used to enforce design restrictions. Students will use SQL to build functionality commonly needed by applications. Database objects covered includes stored procedures, triggers, and constraints.

Syllabus: Database Design and Implementation

Instructor:	_____
Office hours:	_____
Class hours:	_____

Major Instructional Areas

1. Database modeling
2. Database normalization
3. Data Definition Language (DDL) and Data Manipulation Language (DML)
4. Table keys and constraints
5. SQL queries
6. Indexes and views
7. Functions and stored procedures
8. Transaction processing
9. XML documents

Course Objectives

1. Create Entity-Relationship Diagrams (ERDs).
2. Use normalization to improve database design.
3. Implement keys and constraints.
4. Use SQL Data Definition Language (DDL) and Data Manipulation Language (DML) commands.
5. State the purpose of views, indexes, triggers, functions, and stored procedures in terms of their application and usage.
6. Execute SQL queries.
7. Use indexes to optimize performance.
8. Create and use views.
9. Create and use functions, stored procedures, and triggers.
10. Configure and use transaction processing.
11. Create and use XML documents.
12. Use XML Path (XPath) queries to retrieve XML data.

Course Outline

Note: All graded activities, except the Project and exams, are listed below in the pattern of <Unit Number>.<Assignment Number>. For example, Lab 2.1 refers to the first lab activity in Unit 2.

Unit	Activities
1—Database Planning and Design	- Content Covered: *Database Design and Implementation* - Chapter 1, "Database Planning, Design, and Administration" - Chapter 2, "Entity-Relationship Modeling" - Labs: 1.1, 1.2 - Assignments: 1.1
2—Database	- Read from *Database Design and Implementation*: - Chapter 3, "Normalization"

Unit	Activities
Normalization	• Labs: 2.1 • Assignments: 2.1 • Course Project: Part 1

3—
SQL Language Review
	• Read from *Database Design and Implementation*:
	    ○ Chapter 4, "SQL in a Nutshell"
	    ○ Chapter 5, "SELECT Statement: Common Elements"
	• Labs: 3.1
	• Assignments: 3.1
	• Course Project: Part 2
	• Quizzes: 3.1

4—
Queries and Joins
	• Read from *Database Design and Implementation*:
	    ○ Chapter 6, "SELECT Statements, Table Expressions, and Subqueries"
	    ○ Chapter 7, "SELECT Statement: The FROM Clause"
	• Labs: 4.1
	• Assignments: 4.1
	• Course Project: Part 3
	• Quizzes: 4.1

5—
Subqueries and Aggregates
	• Read from *Database Design and Implementation*:
	    ○ Chapter 8. "SELECT Statement: The WHERE Clause"
	    ○ Chapter 9. "SELECT Statement: SELECT Clause and Aggregation Functions"
	• Labs: 5.1
	• Course Project: Part 4
	• Assignments: 5.1
	• Quizzes: 5.1

6—
Tables and Constraints
	• Read from *Database Design and Implementation*:
	    ○ Chapter 10, "Creating Tables"
	    ○ Chapter 11, "Specifying Integrity Constraints"
	• Labs: 6.1
	• Assignments: 6.1
	• Course Project: Part 5
	• Exam I

7—
Indexes and Views
	• Read from *Database Design and Implementation*:
	    ○ Chapter 12, "Using Indexes"
	    ○ Chapter 13, "Views"
	• Labs: 7.1
	• Assignments: 7.1
	• Course Project: Part 6
	• Quizzes: 7.1

8—
Stored Procedures, Functions, and Triggers
	• Read from *Database Design and Implementation*:
	    ○ Chapter 14, "Stored Procedures"
	    ○ Chapter 15, "Stored Functions"
	    ○ Chapter 16, "Triggers"
	• Labs: 8.1
	• Assignments: 8.1
	• Course Project: Part 7
	• Quizzes: 8.1

9—	• Read from *Database Design and Implementation*:

Unit	Activities
Transaction Processing	o Chapter 17, "Transactions and Multi-User Usage" o Chapter 18, "Distributed DBMSs - Concepts and Design" • Labs: 9.1 • Assignments: 9.1 • Course Project: Part 8
10— Schema Data Processing	• Read from *Database Design and Implementation*: o Chapter 19, "Creating Markup with XML" o Chapter 20, "Schemas" o Chapter 21., "XML Path Language" • Labs: 10.1 • Assignments: 10.1 • Course Project: Part 9 • Quizzes: 10.1
11— Course Review and Exam	• Review • Exam II

Instructional Methods

This curriculum is designed to promote a variety of teaching strategies that support the outcomes described in the course objectives and that foster higher cognitive skills. Delivery makes use of various media and delivery tools.

This course builds on what you learned in Introduction to Databases, beginning with a more detailed look at Entity-Relationship (ER) modeling and data normalization. The course introduces additional database objects, including how keys and constraints are used to enforce design restrictions. The course includes more advanced SQL commands and data storage and retrieval in XML documents.

You should already be familiar with ER modeling, data normalization, basic SQL statements, and XML. These are critical content areas and the course reviews and expands on these areas. The remaining areas are new content critical to building efficient and effective database solutions.

The course includes extensive hands-on activities, focusing primarily on standard SQL language statements. Where necessary to treat more advanced concepts, database platform-specific SQL statements and syntax are used.

Assignments are designed to strengthen your writing skills while emphasizing key database design and implementation concepts. You will be expected to explain database solution decisions clearly and concisely.

The course project is structured as a group project. The project will require you to build a database modeled on a business case representing real-world business requirements. You will propose components of the database solution required by the project and will have to design database objects not only to meet solution needs, but also to ensure compatibility with other students' database components.

Instructional Materials and References

Student Textbook Package

Lans, R. F., Connolly, T., Begg, C., Deitel, H. M., Deitel, P. J., Nieto, T. R., et al. (2009). *Database design and implementation* (Custom ed.). Boston, MA: Pearson Custom.

Other Required Resources

In addition to the student textbook package, the following is also required in this course:
- Internet access

Equipment and Tools

- Standard classroom PC
- Microsoft Windows XP Professional Service Pack 2 (on virtual machine)
- VMware Player 4.01 (or later) (on host machine of lab computer)
- ITT-Lab virtual machine
- Microsoft Visio (on host machine of lab computer)
- Microsoft Office (on host machine of lab computer)

References

ITT Tech Virtual Library

Log on to the ITT Tech Virtual Library at http://www.library.itt-tech.edu/ to access online books, journals, and other reference resources selected to support ITT Tech curricula.

Books

You may click "Books" or use the "Search" function on the home page to find the following books.
- ITT Tech Virtual Library> Main Menu> Books> Books 24x7
    - Bagui, Sikha, and Richard Earp. *Database Design Using Entity-Relationship Diagrams. Boca Raton, FL: Auerbach Publications, 2003.*
    - Dewson, Robin. *Beginning SQL Server 2005 for Developers: From Novice to Professional. Berkeley, CA: Apress, 2006.*
    - Gehani, Narain. *The Database Book: Principles & Practice Using MySQL. Summit, NJ: Silicon Press, 2007.*
    - Haley, M. Alan. *The Concordance Database Manual. Berkeley, CA: Apress, 2006.*
    - Halpin, Terry. *Information Modeling and Relational Databases: From Conceptual Analysis to Logical Design. San Francisco: Morgan Kaufmann Publishers, 2001.*
    - Horn, John W., and Michael Grey. *MySQL: Essential Skills. Emeryville, CA: McGraw-Hill/Osborne, 2004.*
    - Muller, Robert J. *Database Design for Smarties: Using UML for Data Modeling. San Francisco, CA: Morgan Kaufmann Publishers, 2001.*
    - Nielson, Paul. *SQL Server 2005 Bible. Indianapolis, IN: John Wiley & Sons, 2007.*
    - Powell, Gavin. *Beginning Database Design and Implementation. Indianapolis, IN: Wiley Publishing, 2006.*
    - Powell, Gavin. *Beginning XML Databases. Indianapolis, IN: Wiley Publishing, 2007.*
    - Reingruber, Michael, and William W. Gregory. *The Data Modeling Handbook: A Best-Practice Approach to Building Quality Data Models. Indianapolis, IN: John Wiley & Sons, 1994.*
    - Shapiro, Jeffrey. *Microsoft SQL Server 2005: The Complete Reference. New York: McGraw-Hill/Osborne, 2007.*
    - Siau, Keng. *Contemporary Issues in Database Design and Information Systems Development. Hershey, PA: IGI Publishing, 2007.*
    - Silverston, Len. *The Data Model Resource Book: A Library of Universal Data Models for All Enterprises, Revised Edition, Volume 1. New York: John Wiley & Sons, 2001.*
    - Silverston, Len. *The Data Model Resource Book: A Library of Universal Data Models for All Enterprises, Revised Edition, Volume 2. New York: John Wiley & Sons, 2001.*

- ITT Tech Virtual Library> Main Menu> Books> NetLibrary
    - Halpin, T.A. *Information Modeling and Relational Databases: From Conceptual Analysis to Logical Design. San Francisco: Elsevier, 2001.*

Periodicals

You may click "Periodicals" or use the "Search" function on the home page to find the following periodicals.

- ITT Tech Virtual Library> Main Menu> Periodicals>
    - *Database Journal*
- ITT Tech Virtual Library> Main Menu> Periodicals> Proquest Computing>
    - *Computer Weekly*
    - *Information Week*
    - *Journal of Logic and Computation*
    - *SQL Server Magazine*
    - *Worldwide Databases*

Reference Resources

You may click "Reference Resources" or use the "Search" function on the home page to find the following reference resources.

- Free Online Dictionary of Computing
- Glossary of Internet Terms
- Webopedia

Learning Guides

You may click "Learning Guides" or use the "Search" function on the home page to find the following learning guides.

ITT Tech Virtual Library> Main Menu> Learning Guides> Online Tutorials
- Computer Technical Tutorials
- Edumax
- Programming Tutorials
- SQL Course
- XML Beginner's Guide

Other References

The following resources may be found **outside** of the ITT Tech Virtual Library, whether online or in hard copy.

Websites

- Microsoft Developer Network (MSDN)
  http://msdn2.microsoft.com/en-us/default.aspx
  This vendor page links to information about developer tools, languages, and Web and application-specific development.
- MySQL Home Page
  http://www.mysql.com
  This page links to news, demos, applications, and education concerning the MySQL open source database.

All links to Web references outside of the ITT Tech Virtual Library are always subject to change without prior notice.

Course Evaluation and Grading

Evaluation Criteria Table

The final grades will be based on the following categories:

CATEGORY	WEIGHT
Assignments	10%
Course Project	15%
Labs	25%
Exam I	20%
Quizzes	10%
Exam II	20%
Total	100%

Grade Conversion Table

The final grades will be calculated from the percentages earned in the course, as follows:

A	90–100%	4.0
B+	85–89%	3.5
B	80–84%	3.0
C+	75–79%	2.5
C	70–74%	2.0
D+	65–69%	1.5
D	60–64%	1.0
F	<60%	0.0